

The Mating Systems of Some Epiphytic Polypodiaceae

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ABSTRACT.—Genetic loads, estimated from sporophyte production by isolated gametophyte cultures, indicate mating systems of intragametophytic selfing in *Campyloneurum angustifolium* (in part), *C. phyllitidis*, *Phlebodium aureum* and *Phymatosorus scolopendria*, and intergametophytic mating in *C. angustifolium* (in part), *Microgramma heterophylla* and *Polypodium pellucidum*. Polyploidy characterizes the intragametophytic-selfing species, whereas the intergametophytic-mating taxa are diploid. The duplicated loci of polyploid taxa may mitigate the expression of recessive lethal alleles caused by intragametophytic selfing, whereas genetic load probably maintains the mating systems of the intergametophytically mating taxa. Enzyme electrophoretic patterns of fixed heterozygosity support allopolyploid origins of *C. phyllitidis* and *P. aureum* and confirm their intragametophytic mating systems. Antheridiogens, present in both groups, may promote intergametophytic mating in diploids through promotion of the early development of male plants in gametophyte populations and bisexuality in isolated gametophytes of polyploids if these gametophytes delay or do not attain insensitivity to their own antheridiogen. In the polyploids, antheridiogens may also alleviate low genetic variability through promotion of occasional outcrossing. The perennial, clone-forming habit of epiphytic Polypodiaceae increases the duration and the physical space occupied by derivatives of a single spore, thus expanding the chance of interaction with a later migrant. Genetic load, duplicated genes, and antheridiogens, together with a perennial and clone-forming gametophyte growth habit, interact to produce successful breeding strategies of these epiphytic species.

Three mating systems have been documented in ferns: intragametophytic selfing, intergametophytic selfing, and intergametophytic crossing (Klekowski, 1979). The more general term intergametophytic mating refers to either or both of the last two systems when it is not possible to determine whether cross-mated gametophytes are from the same (intergametophytic selfing) or different (intergametophytic crossing) sporophytes.

Because gametophytes are potentially bisexual, it had been thought that intragametophytic selfing was predominant in homosporous ferns (Klekowski, 1979), and high selfing rates have been reported in some diploid homosporous ferns, especially those with subterranean gametophytes (e.g., Soltis and Soltis, 1986a) and in some pioneering species (Crist and Farrar, 1983). Intragametophytic selfing also seems to be the trend in species that are polyploid with respect to other species in a genus. Possibly the duplicated loci

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